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Ideas included are the product of an intensive workshop held to study the public school education of exceptionally talented children. Programs are aimed at developing better facility in the skills of abstract thinking, organization, discriminating judgment, creative writing, and the ability to engage profitably in group activity. Included in the language program are subjects from philosophy to practice of language skills and literature assignments in the works of Twain and Poe. In the social studies program emphasis is given to the strengthening of democratic aspects of our society and a respect for our and other cultures. The Greek, Roman, English, African and other civilizations and cultures are studied. To meet the challenge of broadening and deepening mathematical maturity, enrichment is provided in meanings and principles, rather than in facts and procedures. Similar emphasis by means of more creative experiences, is given in the science program. Also included in the program are art history, fundamentals in music theory, and a general study of music.					
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The Challenge . . .

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A PROGRAM
for
GIFTED CHILDREN
in the
SIXTH GRADE

THE CHALLENGE
A PROGRAM FOR GIFTED CHILDREN
In the Sixth Grade

THE CHALLENGE

The general objects . . . are to provide an education adapted to the years, to the capacity, and the condition of everyone, and directed to their freedom and happiness We hope to avail the state of those talents which nature has sown as liberally among the poor as the rich, but which perish without use, if not sought for and cultivated.

Thomas Jefferson
Notes on Virginia

Copies of this publication may be obtained from the Guidance Clinic,
Western Carolina College, Cullowhee, North Carolina. Price \$1.50

THE CHALLENGE
A PROGRAM FOR GIFTED CHILDREN
In the Sixth Grade

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SECOND EDITION

Guidance Clinic
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FOREWORD TO FIRST EDITION

This guide is the consummation of an intensive workshop held at Western Carolina College sponsored by the North Carolina Commission to Study the Public School Education of Exceptionally Talented Children.

Gratitude is expressed to the following dedicated teachers, principals, and supervisors for their painstaking and intelligent devotion in the preparation of these guides.

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Wells, Mamie Perry
Williams, Maude T.

C. Douglas Carter
Editor

FOREWORD TO SECOND EDITION

The first edition of this publication was very well received by teachers not only in North Carolina but also throughout the United States. Three runs were made of the first edition. Many teachers who used the booklet made helpful suggestions.

Graduate students enrolled in courses in "The Gifted Child" during the summer session 1962-63 were organized in committees to revise the manuscript. I therefore wish to acknowledge with thanks the contributions of the following teachers:

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Cain, Stella

Mills, Barbara
Moore, Minnette
Rogers, Geraldine D.
Taylor, Emma Jean

As this booklet continues to be used, we trust that we may receive comments and suggestions from you.

Harold H. Bixler
Editor

July, 1963

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TO THE TEACHER

This guide represents the cooperative efforts of the teachers of North Carolina who were chosen by the Commission to Study the Public School Education of the Exceptionally Talented and by the State of North Carolina to develop an enrichment program that will not only meet the needs of the exceptionally talented, but will be helpful in providing an enrichment program for all children, since "the keynote to all good teaching is enrichment."

From such a program, we believe will come facility in the skills of abstract thinking, organization, discriminating judgment, creative writing and the ability to engage profitably, and purposefully, in group activity; hence, enrichment will result.

The planners further think that enrichment will accrue, only to the extent that children learn the essential skills and that subject matter becomes meaningful and purposeful to the learner.

It is also our belief that, if these activities are carefully and intelligently followed beyond the development of skills, there will be a depth of understanding which will result in critical and conceptual thinking on the part of the learner.

This outline represents a nucleus of purposeful planning, whereby the resourceful teacher may broaden the scope and implement a program that is more extensive than that of the course of study as outlined by the Department of Public Instruction in the State of North Carolina and will add depth and breadth to the teaching program.

THE LANGUAGE ARTS PROGRAM
FOR GRADE SIX

Areas to Be Discussed

- I. Study Skills
- II. Creative Writing
- III. Edgar Allan Poe
- IV. Mark Twain
- V. Heritage of Our English Language

Philosophy of Language Arts

The Language Arts are the arts of communication which should be a part of the intellectual equipment of every citizen in a democracy such as ours. As taught in our schools these arts should enable pupils to read with comprehension and appreciation, to use books and public libraries skillfully, to think clearly and logically, to speak correctly and interestingly, to write creatively and intelligibly in legible handwriting, and to learn to listen appreciatively.

The classroom teacher has a definite obligation toward the gifted child (as well as to all pupils) to make sure that he has a sound knowledge of the basic fundamental skills in reading, handwriting, spelling, and correct language usage in all written work in proper sequence. Necessary precautions should be taken to prevent gaps that cause confusion and frustration at a higher level.

If the Language Arts instruction and uses are classified functionally to include receptive communication (reading and listening), expressive communication (oral and written expression), and a high standard of language skills is insisted upon and required in all subject areas, then we can expect that each child's needs in the use of the Language Arts have been met or are in the process of being met.

Also, if an enriched and effective program has been implemented, we can expect that each child has developed a philosophy for himself which will best promote his own growth and capacity for service to others through the use of the Language Arts.

The gifted child, as well as all others, should have his reading lessons in homogeneous groups. Each child should work on the skills he needs. Self-confidence and interest in acquiring these skills help the child to become an independent reader.

All children should be taught to read critically, to evaluate, and to analyze the printed pages, and to listen skeptically to the claims of television and radio advertisements with their extravagant claims and selling media.

Children also need help in learning to read in the content subjects in order to get the information that they need. The teacher should point out all the aids provided by the textbook writers in the make-up of the pages and chapters.

Instruction in oral and written language skills can be assured if the teacher follows closely the helps in the language textbooks.

Lessons in handwriting should be given to improve the handwriting of each child. It helps to praise the well-written papers, too. In order to improve the handwriting skill, the teacher may need to work with the pupils individually. Praise of the well-written paper may provide incentive.

Spelling may be improved through learning new words in each unit of work. Students may be instructed to keep individual spelling lists, learn to spell by syllables, and learn the correct pronunciation of words.

All pupils need instruction in good study habits and skills in order to work up to their potential.

Study Skills

Subject Matter to Be Covered

1. The organization of the library
2. The organization of books
3. The art of note taking, outlining, classifying, and summarizing
4. The use of maps and globes
5. Rules for general studying - applicable to all study areas
6. Use of sources of information

Activities

1. Take the children to the library and have the librarian explain the Dewey Decimal System and illustrate methods of locating specific information.
2. Assign specific items for children to locate in the library.
3. Assign each child one specific subject related to a larger unit and have him take notes on the topic and be responsible for class discussion of the item. (Note: A historical subject such as the French-Indian War would be particularly appropriate in this relation since it would lend itself to the use of maps and globes.)
4. Have the children make individual maps of the area under discussion and locate the important geographical centers.
5. Have a class discussion on ways to improve study habits at home.

Materials Necessary for This Study

1. Well-equipped library
2. Maps and globes
3. Unit built around a historical subject

Bibliography

Dawson, Mildred A., Jonnie Mashburn Miller, and Marian Zollinger, Language for Daily Use. New York: Tarrytown-on-Hudson, 1959.

Greene, Harry A., Maude McBroom, Ruth Moscrip, and Norma Gillett, Building Better English For Every Need. Evanston, Illinois: Row, Peterson & Company, 1941.

Kelley, Victor H., and Harry A. Greene, Better Reading and Study Habits. New York: World Book Company, 1947.

Robinson, Francis P., Effective Study. New York: Harper & Brothers, 1961.

Wilcox, Glenn W., Basic Study Skills. Boston: Allyn and Bacon, Inc., 1958.

Creative Writing

Subject Matter to Be Covered

1. Essays - characteristics and types
2. Short Stories - characteristics

Activities

1. Read and discuss several essays, noting the different kinds and characteristics of an essay.
2. Note the organization of essays. Have the class outline one to see the breakdown into introduction, body, and conclusion.
3. Check several essays for varied beginnings and endings.
4. Have the class write an essay from a list of assigned topics.
5. Read and discuss several short stories, noting types of short stories and methods of presentation.
6. Discuss the dialogue employed in the short stories, noting any dialect.
7. Let the class write a short story on any topic the students choose.
8. Compare the essay with the short story, discussing their similarities and differences.
9. Have student make oral presentation of story to class.

Materials Necessary for This Study

1. Textbook containing several essays and short stories
2. Characteristics of the essay and short story

Bibliography

Cunningham, Robert Newton, Reading, Writing and Thinking. New York: C. Scribner's Sons, 1943.

Flesch, Rudolf, Franz, and A. H. Lass, The Way to Write. New York: McGraw-Hill, 1955.

Warriner, John E., English Grammar and Composition, Grade 7. New York: Harcourt, Brace and World, Inc., 1961.

Edgar Allan Poe

Subject Matter to Be Covered

1. Poe's life and its relation to his writings
2. Background material dealing with the type of writing (short mystery stories) usually associated with Poe
3. Background material specific to the study of "The Masque of the Red Death"
4. The story of "The Masque of the Red Death"
5. Several of Poe's poems, including "Annabel Lee" and "Eldorado"
6. Characteristics of Poe's literary style

Activities

1. Have students give reports on Poe's life.
2. Teacher should present data in regard to Poe as a literary figure and his place in the development of American Literature.
3. Let the students discuss epidemics and pestilences as background information for the study of "The Masque of the Red Death."
4. Begin reading the story aloud and let the students finish it.
5. Let the students develop bulletin boards concerning Poe.
6. Have the students write their own mystery stories. Perhaps the teacher might mention a few articles such as a glove, a hatchet, a brief case, etc. and let the students incorporate these objects into their stories.
7. Listen to recordings of "The Masque of the Red Death" and some of Poe's poetry.
8. Assign students to study specific aspects of "Annabel Lee" and "Eldorado."
9. Request students to keep list of unfamiliar words.

Materials Necessary for This Study

1. A textbook which includes the story of "The Masque of the Red Death" and some of Poe's poetry
2. Recordings of Poe's works
3. A good biographical reference book on Poe
4. Bulletin board materials

Bibliography

Huber, Miriam Blanton, Story and Verse for Children. New York: Macmillan Company, 1958.

Johnson, Edna, and Carrie E. Scott, eds., Anthology of Children's Literature. Cambridge, Mass.: Riverside Press, 1935.

Poe, Edgar Allan, The Complete Poems and Stories of Edgar Allan Poe. Vol. II, New York: Alfred A. Knopf, 1951.

Winwar, Frances, The Haunted Palace: A Life of Edgar Allan Poe. New York: Harper, 1959.

Filmstrip: "The Gold Bug", Famous American Stories, #8371-Encyclopaedia Britannica Films, Inc.

Mark Twain

Subject Matter to Be Covered

1. Biographical study of Mark Twain
2. The style of Mark Twain, including his use of regional dialects
3. Twain's presentation of humor and irony
4. Story of "Blue Jays" from his book A Tramp Abroad.
5. Twain's reproduction of sound and rhythm of language
6. Twain's satirical approach
7. Readings of episodes from Huckleberry Finn and Tom Sawyer

Activities

1. Have each person contribute a fact concerning Mark Twain's life to the class.
2. Read some passages from The Adventures of Huckleberry Finn to illustrate regional dialects.
3. Read aloud the story of "Blue Jays," paying particular attention to humor, satire and dialect.
4. Have the students write a short story using one or more different dialects.
5. Let the students write and present a short skit illustrating the use of dialect. Be careful not to confuse dialect with slang.
6. Listen to recordings showing the use of dialects.

Materials Necessary for This Study

1. Paperback editions of The Adventures of Tom Sawyer and The Adventures of Huckleberry Finn
2. Textbook containing the selection of "Blue Jays"
3. Recording of a selection of Twain's writings illustrating dialects

Bibliography

Clemens, Samuel, The Adventures of Tom Sawyer and The Adventures of Huckleberry Finn. (Illustrated by Norman Rockwell) New York: Heritage Press, 1940.

Mason, Miriam E., Mark Twain: Boy of Old Missouri. New York: Bobbs-Merrill Co., 1942.

Paine, Albert Bigelow, The Boys' Life of Mark Twain. New York: Harper and Brothers, 1944.

Film: "Mark Twain Gives An Interview," #59, Coronet Films. 13 minutes.

Heritage of Our English Language

Subject Matter to Be Covered

1. Historical development of the English language
2. The place of foreign words in the English language

Activities

1. Do research on the Anglo-Saxons (the people, their type of life, and customs).
- *2. Offer Beowulf as representative of English at this stage.
3. Study the results of the Norman invasion and changes in the life of the people and the language.
- *4. Offer Chaucer's Canterbury Tales as representative of the language of the Middle English period.
- *5. Offer a selection by Shakespeare as representative of Elizabethan English and compare it with the other selections previously mentioned.
6. Offer samples of the language from the seventeenth century to modern times.
7. Note the development of new words because of advanced technology.
8. Make a bulletin board illustrating the various phases the English language has passed through.
9. Listen to recordings of selected works to show the changes in pronunciation.
10. Make lists of common words that we still use which had their origin in an earlier period.

Materials Necessary for This Study

1. Copies of Beowulf, Canterbury Tales and other selected works
2. Recordings of representative works to illustrate language changes
3. Bulletin board materials

Bibliography

Baugh, Albert Croll, A History of the English Language. New York: Appleton-Century-Crofts, 1957.

McKnight, George H., English Words and Their Background. New York: D. Appleton and Company, 1923.

Pei, Mario Andrew, The Story of English. Philadelphia: Lippincott, 1952.

*Note: These works are not to be studied in detail. They are to be used only to illustrate language changes.

9

THE SOCIAL STUDIES PROGRAM

FOR GRADE SIX

Areas to Be Discussed

- I. Prehistoric Life
- II. Early Greek Civilization
- III. The Roman Empire
- IV. The Middle Ages
- V. English Culture
- VI. The Land of India
- VII. African Culture
- VIII. United Nations

NOTE: The teacher who decides to use this outline should expand these ideas to meet his individual needs.

Philosophy of Social Studies

Social studies help a child gain and keep his self-respect through their stress on the worth of the individual. They strengthen the democratic aspects of our culture by emphasizing human relations. Under the guidance of an efficient teacher, children develop self-direction and cooperation in individual and group activities. A sense of security increases as children learn the mastery of the technique of problem solving. Children gain confidence in their own ability to work out solutions. The worth of the individual is enhanced by the numerous opportunities for self-expression. An important phase of the social studies unit is the effective location, selection, organization, evaluation, and presentation of information. Children should appreciate and respect the dignity and personality of all individuals regardless of differences in race, class, color, creed, or cultural background. The elementary schools develop the values which are desirable in a democracy and in a world which technology has drawn so closely together that all men are neighbors.

Through effective social studies instruction, we can expect children to have increased respect and understanding for people of the world and to develop a greater appreciation for our own cultural heritage. Educated children will become informed citizens who accept the civic responsibilities of their community, country, and world. They will try to promote social, economic, and scientific advancements for the best interests of all people.

Prehistoric Life

Activities

1. Have a display of the crude implements that early man used.
2. Describe the social activities of the caveman..
3. Illustrate the art of early man. List the art materials that he used.
4. Make oral reports on transportation.
 - a. Animals
 - b. Wheels
 - c. Sails

Compare these modes of transportation with modern transportation.

5. Imagine that you are a caveman.. Write a description of your activities for a two-day period.

Bibliography

Hartman, Gertrude, Builders of the Old World. Boston, Massachusetts: D. C. Heath and Company, 1946.

Kelty, Mary G., Other Lands and Other Times. Boston, Massachusetts: Ginn and Company, 1951.

Meyer, J. G., The Old World and Its Gifts. Chicago, Illinois: Follet Publishing Company, 1947.

Early Greek Civilization

Activities

1. Study the city-states. Compare many small governments with a strong central government.
2. Organize a class government.
3. List some privileges and responsibilities of citizens in a democracy.
4. Compare Athenian and U. S. democracies.
5. Study The Iliad and The Odyssey.
6. Read Greek myths.
7. Compare Greek myths with modern ones such as the Lone Ranger.
8. Use a Greek poem for a choral reading.
9. Have individual research on the great scientists and scientific achievements of the early Greeks.
10. Explain how these early discoveries affect present-day science projects.
11. Describe the Parthenon. List some famous buildings of today that are similar in design.
12. Make soap carvings and plaster of Paris figures of Greek statues.
13. Make illustrations of Greek vases.

Bibliography

Hartman, Gertrude, Builders of the Old World. Boston, Massachusetts: D. C. Heath and Company, 1946.

Kelty, Mary G., Other Lands and Other Times. Boston, Massachusetts: Ginn and Company, 1951.

Meyer, J. G., The Old World and Its Gifts. Chicago, Illinois: Follet Publishing Company, 1947.

The Roman Empire

Activities

1. Write descriptions of Roman Empire and aqueducts. Compare these with some engineering wonders of today.
2. Discuss the importance of just laws. Invite a lawyer to explain how Roman law influenced our present-day laws.
3. Compare Roman and Greek religions.
4. Draw a map of the Roman Empire.
5. Make a time line showing the important events in Roman history.
6. Write a summary of the rise and fall of the Roman Empire.
7. Discuss the gladiatorial events and other sports events of the day.

Bibliography

Hartman, Gertrude, Builders of the Old World. Boston, Massachusetts: D. C. Heath and Company, 1946.

Kelty, Mary G., Other Lands and Other Times. Boston, Massachusetts, Ginn and Company, 1951.

Meyer, J. G., The Old World and Its Gifts. Chicago, Illinois: Follet Publishing Company, 1947.

The Middle Ages

Activities

1. Describe the appearance and structure of a castle.
2. Have a round-table discussion about the knights and serfs.
3. Make a map showing the routes of the Crusaders. List the results of the Crusades.
4. Organize a guild and learn different crafts.
 - a. Wood carving
 - b. Weaving
 - c. Sewing
 - d. Leather crafts
5. Compare guilds and labor unions.

Bibliography

Hartman, Gertrude, Builders of the Old World. Boston, Massachusetts: D. C. Heath and Company, 1946.

Kelty, Mary G., Other Lands and Other Times. Boston, Massachusetts: Ginn and Company, 1951.

Meyer, J. G., The Old World and Its Gifts. Chicago, Illinois: Follet Publishing Company, 1947.

Southworth, Gertrude Van Duyn, and John Van Duyn, The Story of the Middle Ages. Syracuse, New York: Iroquois Publishing Company, Inc., 1946.

English Culture

Activities

1. Have individuals or committees make comprehensive studies of various phases of English culture.
 - a. Music
 - b. Literature
 - c. Art
 - d. Education
 - e. Government
 - f. Religion
2. Have children read English poems and folk stories. Learn some British folk songs and study about the people who wrote the poems, songs, and stories.
3. Make a world trade map. List the problems of early English traders. Explain how the trade affected the culture.
4. Make and display a collection of flags of the British Commonwealth. Have the children read extensively to learn how and why England has acquired so much territory in different parts of the world.
5. Have a debate. Resolved: That the British Dominions should have independence.

Bibliography

- Bodley, G. R., Peoples of Other Lands. Syracuse, New York: Iroquois Publishing Company, Inc., 1946.
- Hutton, Clarke, Picture History of Britain. Boston, Massachusetts: Houghton Mifflin Company, 1946.
- Russell, Mary, Great Britain and Canada. New York: The Macmillan Company, 1950.
- Sloane, William, The British Isles. New York: Holiday House, 1951.

The Land of India

Activities

1. Make comprehensive studies of the races, religions, and languages in India.
2. Plan a conducted tour of India. Note the different customs in each section.
3. Observe the agricultural and manufacturing areas of India.
4. List some of the problems that India faces as an independent nation.
5. Write biographies of famous Indian leaders.
 - a. Gandhi
 - b. Jinnah
 - c. Nehru
6. Illustrate the different types of transportation used in India today.
7. Describe how coconut oil is made.
8. Make a vocabulary list of Indian words.

Bibliography

- Kennedy, Jean, Here Is India. New York: Charles Scribner's Sons, 1945.
- McClellan, Grant S., India. New York: H. W. Wilson Company, 1960.
- Morais, Francis, India Today. New York: The Macmillan Company, 1960.
- Moreland, W. H., A Short History of India. New York: Longmans, Green and Company, 1958.
- Riencourt, Amaury de, Soul of India. New York: Harper and Brothers, 1959.
- Sheean, Vincent, Nehru, The Years of Power. New York: Random House, 1960.
- Spear, Thomas G. P., India, A Modern History. Ann Arbor, Michigan: University of Michigan Press, 1961

African Culture

Activities

1. Compare the size and topography of Africa with other continents.
2. Conduct individual and committee research on the exploration of Africa. Have a quiz program on the famous explorers.
3. Make a thorough study of African diamond mines.
4. Study the different types of government in Africa.
5. Have a debate. Resolved: That the Divisions of Africa should form a United States of Africa.
6. List the natural resources of Africa.
7. Draw a resource map.
8. Study customs of several of the African tribes.
9. Study the educational status of Africans.
 - a. Urban Africans
 - b. Rural Africans
10. Study the development of language in the various nations of Africa and the influence of colonization.
11. Study the diseases that are prevalent in Africa and the means used to treat them.

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- Gatti, Ellen Morgan, Here Is Africa. New York: Charles Scribner's Sons, 1943.
- Anderson, Erica, The World of Albert Schweitzer. New York: Harper and Brothers, 1955.
- Caldwell, John C., Let's Visit Middle Africa; East Africa; Central Africa; The Congo. John Day, 1958.
- Melady, Thomas Patrick, Profiles of African Leaders. New York: The Macmillan Co.
- Sampson, Anthony, Common Sense About Africa. New York: The Macmillan Company, 1961.
- Stamp, Lawrence Dudley, Africa. New York: John Wiley & Sons, Inc., 1953.
- Sutton, Felix, Illustrated Book About Africa. New York: Grosset & Dunlap, 1959.
- Stinetorf, Louise A., Children of South Africa. Philadelphia: J. B. Lippincott Company, 1945.

United Nations

Activities

1. Study the Magna Charta, Declaration of the Rights of Man, Declaration of Independence, Bill of Rights and the Universal Declaration of Human Rights. Note the similarities of these documents.
2. Make individual reports on some of the countries that are members of the United Nations.
3. Discuss the various divisions of the United Nations.
4. Compare the United Nations to the League of Nations and note their similarities and differences.
5. Have a mock meeting of the United Nations General Assembly. Discuss a current problem of the United Nations and present possible solutions.
6. Do some research on how the buildings of the U. N. were financed and the contributions of the various nations.
7. Do intensive research on one of the small organizations of the United Nations such as UNESCO.
8. Make a bulletin board showing the influence of the United Nations.

Bibliography

United Nations, Yearbook of the United Nations. 1960.

Necessary Materials for This Study

Maps and Charts

1. British Isles
2. World (physical and political)
3. Europe (physical and political)
4. Asia (physical and political)
5. Africa (physical and political)
6. Ancient History
7. Medieval and Modern History

Reference Books

1. World Book Encyclopedia
2. Compton's Encyclopedia
3. The World Almanac
4. Dictionaries

Magazines and Newspapers

1. National Geographic
2. National Geographic School Bulletin
3. Holiday
4. Life
5. Time
6. U. S. News and World Report
7. The Young Citizen
8. Current Events
9. Local newspaper

Filmstrips - Encyclopedia Britannica

1. Children of Many Lands
2. Learning to Use Maps
3. Cities of Europe
4. Africa
5. Middle East and India
6. Medieval Europe
7. Prehistoric Life
8. The History of Western Culture
9. The World's Great Religions
10. Rome
11. Parliamentary Procedure

Films - Coronet

1. Ancient Greece
2. Ancient Rome
3. The Meaning of Feudalism
4. British Isles
5. A Village in India

For filmstrips write: Encyclopedia Britannica Films, Inc.,
1150 Wilmette Avenue, Wilmette, Illinois.

For films write: Coronet Instructional Films,
65 East South Water Street, Chicago 1,
Illinois.

THE MATHEMATICS PROGRAM

FOR GRADE SIX

Areas to Be Discussed

- I. Understanding Numbers
- II. Fractions
- III. Problem Solving
- IV. Graphs
- V. Understanding Geometry
- VI. Measurement
- VII. Understanding Decimals
- VIII. History of Mathematics
- IX. Mental Mathematics

Philosophy of Mathematics

We believe that gifted children need to be challenged and need to do mathematical thinking in accordance with their mental maturity.

An enrichment program is necessary to provide such a challenge. It should stimulate deeper thinking and improve the achievements of students with high ability who do not perform scholastically in keeping with their ability.

An enrichment program should emphasize meanings, principles, and relationships in arithmetic teaching rather than facts, skills, and specific habits of procedure.

The base of knowledge should be broadened and should include experiences that will also increase the depth of understanding of mathematical concepts. Gifted children need to increase the level of their skills and develop a real love for learning such skills.

Understanding Numbers

Subject Matter to Be Covered

1. Vocabulary
2. Numeration
3. Properties of numbers
4. Relationship existing between the four fundamental operations
5. Symbols
6. Simple equations
7. Developing number skills

Activities

1. Vocabulary - As each problem area is introduced, the teacher should be aware of the correct mathematical vocabulary needs for that area.
2. Numeration - This is a study of number systems with bases other than 10.

Example: Number system with base 5.

<u>Base 5</u>		<u>Base 10</u>
0	=	0
1	=	1
2	=	2
3	=	3
4	=	4
10	=	5
11	=	6
12	=	7
13	=	8
14	=	9
100	=	10

3. Properties of numbers - This refers to an understanding of the commutative, distributive, and associative properties of numbers.
 - a. Example of Commutative Property:

$$a + b = b + a$$
 - b. Example of Associative Property:

$$(a + b) + c = a + (b + c)$$
 - c. Example of Distributive Property:

$$a(b + c) = (a \cdot b) + (a \cdot c)$$

4. The relationship existing between the four fundamental operations should be presented.

Examples:

Multiplication as a short means of addition.

Multiplication as an opposite of division.

Division as a short method of subtraction.

Division as an opposite of multiplication.

Addition as an opposite of subtraction.

5. Symbols - This section should provide an understanding of the more common symbols that will be used in latter mathematics.

Examples: $3(2)$ as multiplication

$3 \cdot 2$ as multiplication

$3b$ as multiplication

$1 \div 2$ as division

$2 \overline{) 1}$ as division

$\frac{1}{2}$ as division

6. Simple equations - The teacher should show the equation as the mathematician's means of sentence expression.

Example: Two times some number plus four is equal to ten.

$$2a + 4 = 10$$

7. Developing number skills - The teacher should develop number skills and an understanding of our number system.

a. Writing numbers

Examples:

- (1) In the number 687,854,975 how many times does "ty" for tens appear? How many times does the word "hundred" appear? How many times does the word "thousand" appear?

- (2) Write this number in figures: $5 \frac{1}{2}$ billion.

- (3) Fill in the missing words:

million, billion, ?, ?, ?, ?,
 ?, ?, ?, decillion.

- (4) Write the sum without copying the numbers:
 $3,000 + 500 + 60 + 3 =$
- (5) What is the difference between a digit and an integer?
- (6) Write the first twenty integers. Which of these are digits also?

b. Rounding numbers

Examples:

- (1) Round to the nearest billion: 1,782,643,103.
- (2) Any number that can be divided only by itself and 1 is a prime number. Write the prime numbers between 1 and 20.

c. Roman numerals

Examples:

- (1) Write the following as an Arabic number: XC.
- (2) Write this number in Roman numerals: 876.
- (3) Write the following in Roman numerals: your age.

Fractions

Subject Matter To Be Covered

1. Vocabulary
2. An understanding of a fraction as being an expression of division
3. An understanding of the four fundamental operations involving fractions
4. Ratio

Activities

1. Vocabulary - As each problem area is introduced, the teacher should be aware of the correct mathematical vocabulary needs for that area.
2. Fraction as expression of division - The students need to understand a fraction as being an expression of division.

Example: $\frac{1}{2} = 2 \overline{) 1} = 1\frac{1}{2}$

3. The four fundamental operations involving fractions - Students should be given an understanding of the four fundamental operations involving fractions.

Examples:

- a. Why we invert the divisor and multiply:

$$\text{Why is } \frac{1}{2} \div \frac{1}{4} = \frac{1}{2} \times \frac{4}{1} ?$$

- b. Why we must find the least common denominator before we add or subtract fractions:

$$\frac{1}{3} + \frac{1}{4} = \frac{?}{12} \qquad \frac{1}{3} - \frac{1}{4} = \frac{?}{12}$$

- c. Why we multiply numerator by numerator and denominator by denominator when multiplying fractions:

$$\text{Why is } \frac{1}{2} \times \frac{3}{4} = \frac{3}{8} ?$$

4. Ratio - Students should understand the relationship existing between fractions and ratios as comparisons of numbers.

Examples:

- a. Patra picked 15 pts. of berries. Ann picked 12 pts.
How do the amounts compare?

Solution: 15 pts. - 12 pts. = 3 pts. You compare these numbers by subtracting and may say, "Patra picked 3 pts. more than Ann" or "Ann picked 3 pts. less than Patra".

- b. Bob has 10¢. He needs 30¢ to buy a pen. How does 30¢ compare with 10¢? or 10¢ to 30¢?

Solution: 30 is three times larger than 10 ($30 - 10 = 3$)
or: 10 is one-third of 30 ($10/30 = 1/3$)

- c. Lib paid 13¢ for two candy bars. How much did she pay for 4 bars?

Solution: ratio of 2 for 13 = $2/13$ 4 bars cost? = $4/N =$

$$\frac{2}{13} \frac{(x2)}{(x2)} = \frac{4}{26}$$

Four bars cost 26¢

Problem Solving

Subject Matter To Be Covered

1. Reading arithmetic problems
2. Solving problems
 - a. Dealing with money
 - b. The fundamental processes
 - c. Decimals and percentages

Activities

1. Reading arithmetic problems - Stress reading in arithmetic as it differs from other types of reading (an equation as a mathematical sentence).

Example: One morning Sally gathered 3 dozen eggs. She gave 18 eggs to her aunt. How many eggs did she have left?

$$3 (12) - 18 = N$$

2. Solving problems

- a. Dealing with money

Example: Which of these amounts can be paid with four different coins?

90¢	\$1.05
95¢	\$1.06

- b. Fundamental processes

Example: Four children weigh 390 pounds. Betty weighs 90 pounds John weighs 113, George weighs 89, and Patty weighs 98. What is the average weight?

- c. Decimals and percentages

Example: Our community's goal for the United Fund is \$1500.00. At the end of the first week we had collected \$1200.00. What percentage of our goal had we collected at the end of the first week?

Graphs

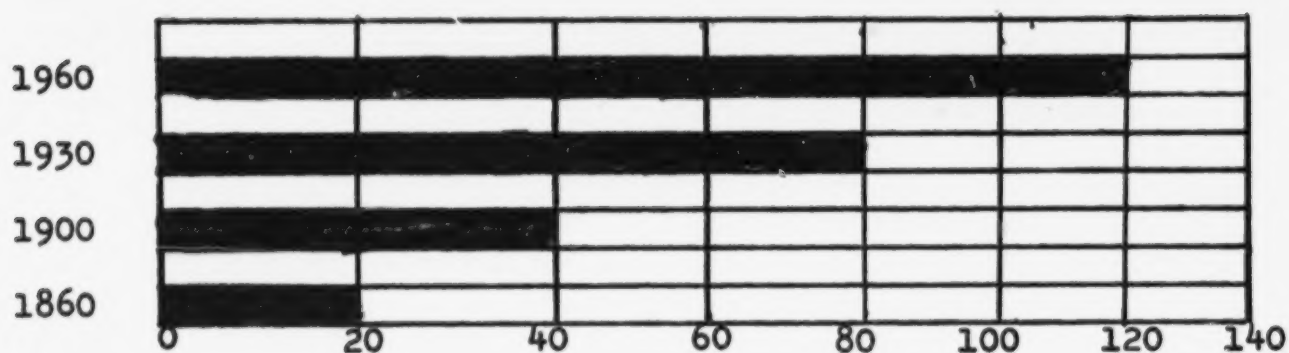
Subject Matter To Be Covered

1. Reading and making bar graphs
2. Making line graphs
3. Making a circle graph
4. Making pictographs
5. Plotting frequencies on a graph

Activities

Understanding Graphs

1. Reading and Making Bar Graphs.



In this graph each "unit" represents 4,000 people.
The populations are shown in round numbers.

- a. According to the graph what was the population in 1860? 1900? 1930? 1960?
- b. What was the increase in population from 1930 to 1960?
- c. Make a bar graph showing the area of England as compared with that of North Carolina.
- d. Make a bar graph comparing the population of England with that of North Carolina.

e.

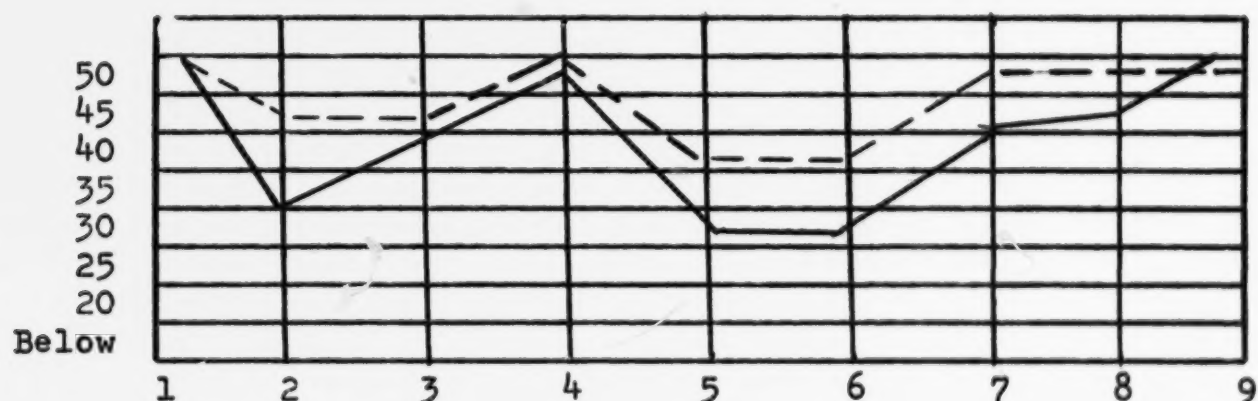
Lacy	63 points
Joyner	42 points
Hayes	51 points
Jackson	45 points
Haywood	37 points

These are the data for the graph. How many bars will they have? The longest bar will represent _____? points; the shortest bar will represent _____? points.

A sixth grade in Lacy School is making a bar graph to show how the number of points they won in a school contest compared with the other schools.

The horizontal scale will run from 0 to a little more than _____. At the left will be space for _____.

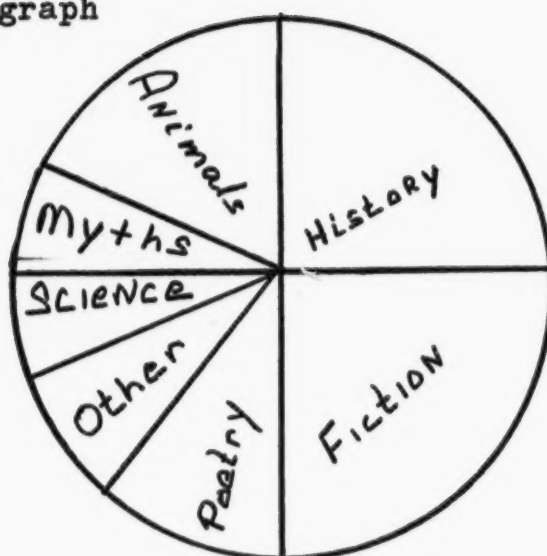
2. Making line graphs



Above is a line graph record of Jane's tests in spelling. Each week she had 50 words to study. The solid line shows the number correct; the broken line the number tried. She did not need to try all the words.

- The first week she tried _____? words, but she wrote only _____? correctly.
- At the end of the sixth week Jane wrote _____? words correctly of the _____? she tried.
- In what weeks did she try all and get all correct?
- Keep a record of the daily temperature on line graph for the next two weeks.

3. Making a circle graph



The illustration above is a circle graph. It is your rainbow chart representing the number of library books you will read this year.

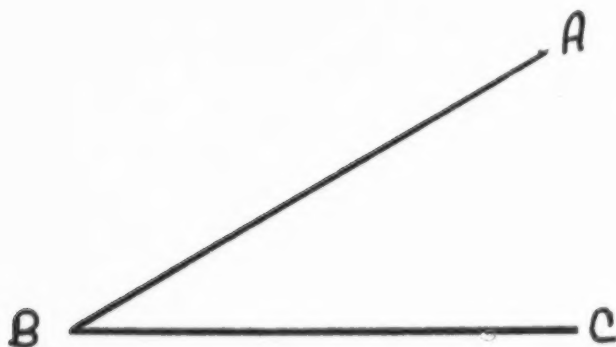
The parts of the circle shaped like pies are called sectors. Each sector shows that part of the total are books about animals, history, fiction, poetry, science, myths, and space travel.

The size of the sector depends on the central angle, the angle at the center between two radii.

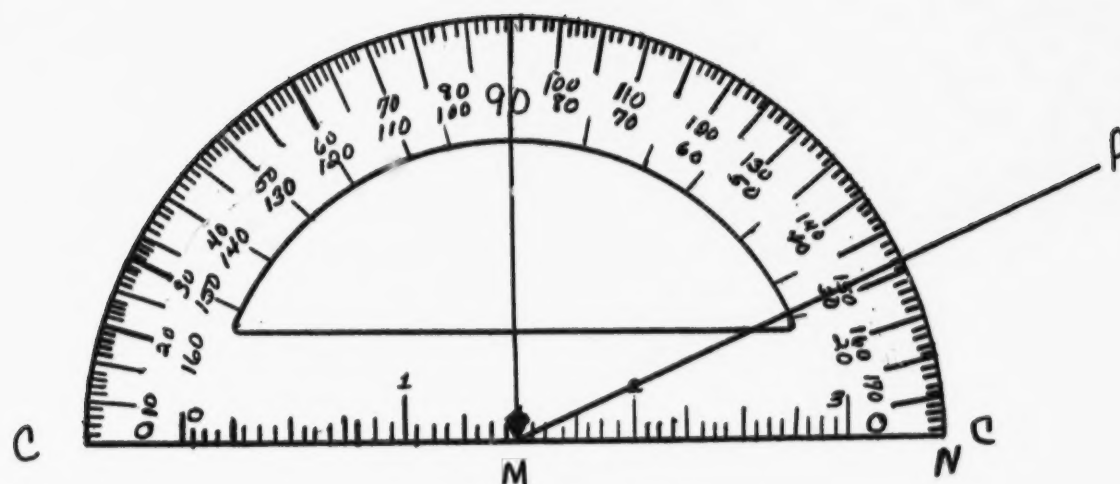
Tell the answers without measuring the central angles:

- The books read most often were books on ? - ? .
- The books called for next often were those about ? .
- Books used least often were those about ? .
- More fiction books were read than were books on , , .

There are 360° in every circle. The central angle for history, is 90° or $1/4$ of all the books read. Use your protractor to measure it. Below is a diagram to show how to measure an angle with a protractor.



First place line MN of the protractor along the starting side BC of the angle ABC so that point M falls at the vertex B. Next read the angle mark on the protractor that lies on the ending of side AB of the angle. In this figure it is at line 30° . Therefore, angle ABC is a 30° angle.



- e. How many degrees do history and fiction cover together?
Now measure with your protractor to check your answer.
- f. How many degrees in $\frac{1}{12}$ of 360° ? $\frac{1}{6}$ of 360° ? $\frac{3}{4}$ of 360°
- g. Make a circle graph showing how you spend your weekly allowance. Work this out in percentages.

4. Making pictographs

Sometimes groups of pictures or symbols are used instead of bars or lines to make graphs. These are called pictographs. You will find such a graph in your textbook and search newspapers and magazines for others to bring to class.

- a. Make a pictograph showing the number of boys and girls in your room.
- b. Make a pictograph to represent the number of hundreds in math. Compare it to the number of hundreds made by the class on Friday.
- c. Make a pictograph showing the number of pupils who own dogs and those who own cats.

5. Plotting frequencies on a graph

A class of 32 pupils had a test with 33 possible correct answers.

Score	Frequency
32	1
31	2
30	1
28	4
27	5
26	7
25	4
22	2
21	1
20	3
19	1
11	1
Totals	32

The table at the side shows the score each pupil made and the frequency of each score.

- What was the highest score?
 - What was the lowest score?
 - How many pupils scored 22?
 - How many pupils scored 19?
- The number of pupils who made a certain score is called the frequency of the score. Which score had the highest frequency?

Make a bar graph showing the frequencies of the score.

- Work out your score as to:
 - % right
 - % wrong
 - ratio missed
 - ratio right
- What was your score in hundredths?

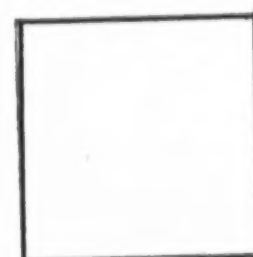
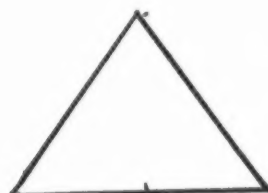
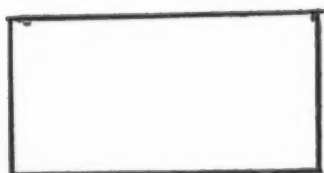
Understanding Geometry

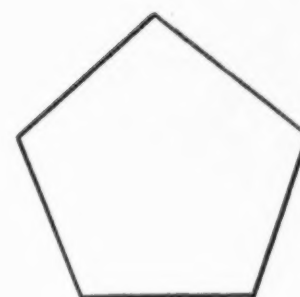
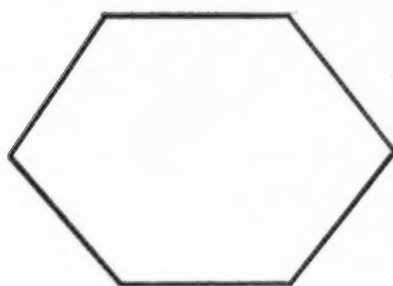
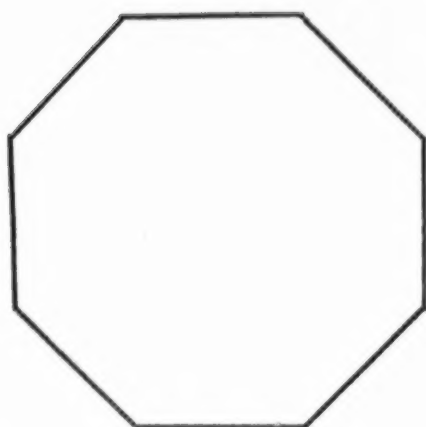
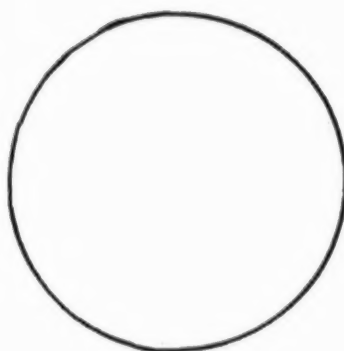
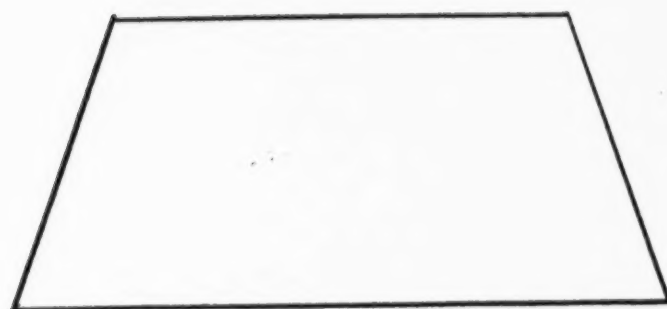
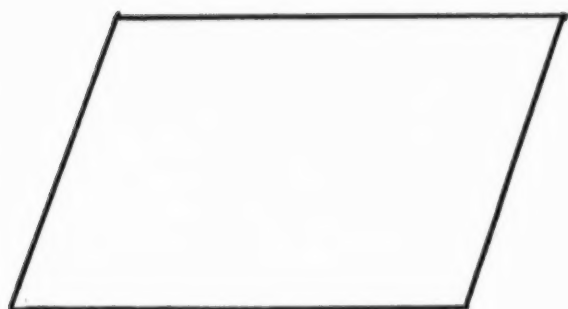
Subject Matter To Be Covered

- Vocabulary
- Plane figures
- Geometry in everyday life
- Geometric designs
- Formulas

Activities

- Vocabulary - As each problem area is introduced, the teacher should be aware of the correct mathematical vocabulary needs for that area.
- Plane figures - Name these figures.

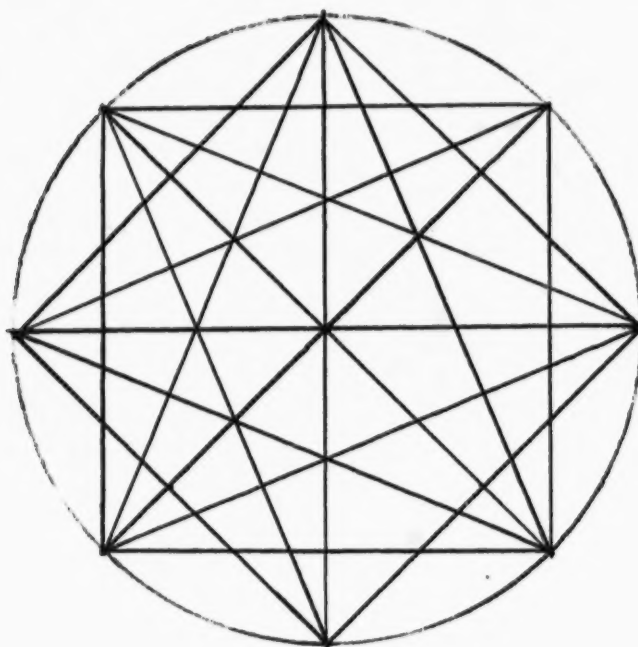




3. Geometry in everyday life - Have the children find examples of the following:

- a. Circle
- b. Triangles
- c. Rectangles
- d. Squares
- e. Parallel lines

4. Geometric designs - Have children make up their own geometric designs.



5. Formulas

- a. Children should discover formulas for finding the area of a perimeter and the circumference of a rectangle, square, triangle, circle, and parallelogram.
- b. Have children discover formulas for finding the third angle of a triangle when two angles are given.
- c. Children should discover the formulas for finding the volume of rectangular solids.

Measurement

Subject Matter To Be Covered

1. Common measures
2. Denominate numbers
3. Problems with common measures
4. Problems involving time, rate, and distance
5. Scale drawing

Activities

1. Common measures
 - a. Understanding how to convert inches to feet, to yards, to rods, to miles; square inches to square feet, to square yards, to square rods, to acres, to square miles.
 - b. Understanding of conversion of liquid and dry measures.

2. Denominate numbers

Examples:

a. Addition of:

1 gal. 4 qts. 1 pt.	5 lbs. 7 oz.
2 gal. 1 qt. 1 pt.	<u>2 lbs. 11 oz.</u>
<u>4 gal. 3 qts.</u>	

b. Subtraction.

6 yds. 1 ft. 7 in.	7 lb. 3 oz.
<u>2 yds. 1 ft. 2 in.</u>	<u>6 lb. 9 oz.</u>

c. Multiplication.

16 ft. 4 in.	4 qt. 1 pt.
<u> x6 </u>	<u> x7 </u>

d. Division.

12 lb. 6 oz. $\div$ 7 =	9 hr. 30 min. $\div$ 2 =
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3. Problems with common measures

Examples:

- a. A temperature report read, "Warmest day in June brings 97° temperature." How many degrees above freezing is this?
- b. Paper is counted by the quire, which is 24 sheets, or by the ream, which is 480 sheets. Your arithmetic text has 390 pages of problems. How many quires is this?

4. Problems involving time, rate, and distance

Example: To solve the following problem, use these formulas:

$$\text{Distance} = \text{Time} \times \text{Rate}$$

$$\text{Time} = \text{Distance} \div \text{Rate}$$

$$\text{Rate} = \text{Distance} \div \text{Time}$$

- a. When the speed of a moving object is 5 m.p.h., the object will move 7.33 feet in a second ($14.66 \div 2$). How far will an object move in a second when the speed is 15 m.p.h.? 35 m.p.h.? 55 m.p.h.? 75 m.p.h.?
- b. George rode his bicycle 3,046 miles from New Jersey to California in 23 days, 21 hours of travel. What was the average mileage per day?
- c. The club's pedometer registered 12 miles. They had walked one mile every 12 minutes. How long had they walked?

5. Scale drawing

Examples:

- a. Construct a scale model of a baseball field showing distances involved.
- b. Map a scale drawing of an airport showing runways and approaches.

Understanding Decimals

Subject Matter To Be Covered

1. Reading and writing decimals
2. Changing common fractions to decimals and decimals to common fractions
3. Rounding off decimals
4. The four fundamental operations as related to decimals

Activities

1. Reading and writing decimals

Examples:

- a. Write as decimals - $7/10$, $7/100$, $7/1000$, $7\ 7/1000$
- b. Read and write as a decimal - Three and seventeen twentieths
- c. Arrange in order of value, writing the largest to the smallest -
75, .075, 7.5, .75, 75.75

2. Changing common fractions to decimals and decimals to common fractions

Examples:

- a. Write as decimals - $1/2$, $1/3$, $1/4$, $1/5$, $1/6$, $1/8$, $1/10$
- b. Write as common fractions reduced to the lowest terms -
.835, .16 $2/3$, .75, .87 $1/2$, .625

3. Rounding off decimals

Example: Decimals can be rounded off the same way whole numbers can.

4.50		4.40	
4.49		4.41	
4.48		4.42	= 4.4
4.47	= 4.5	4.43	
4.46		4.44	
4.45			

4. The four fundamental operations as related to decimals

Examples:

- a. Addition of decimals

Place decimal under decimal and add. Decimal in the sum must be placed under the decimal in the addends.

(1) Add the following:

$$.4 + 4.04 + 30 + .303$$

(2) Keep tally of your car mileage gage for 7 days. Add these.

b. Subtraction of decimals

Place decimal under decimal and subtract. Decimal in the difference must be placed under the decimals in the subtrahend and minuend.

(1) Subtract the following and check two ways:

$$\begin{array}{r} 12.01 - .12 = 12.01 \\ \quad \quad \quad - .12 \\ \hline \quad \quad \quad 11.89 \end{array}$$

(2) Today's temperature was 91.3° . How far above freezing was this?

c. Multiplication of decimals

When multiplying decimals, point off as many places in the product as there are in the multiplier and multiplicand together.

(1) Place the decimal in the product:

$$\begin{array}{l} 54.26 \times 13.97 = 758.0122 \\ .3 \times .2 = .06 \text{ (not } .6 \text{ or } .60) \end{array}$$

(2) Develop understanding for multiplying by 10, 100, 1,000

- (a) $10 \times 48 = 480$
- (b) $100 \times 48 = 4,800$
- (c) $1000 \times 48 = 48,000$

d. Dividing decimals

To divide a decimal by a whole number, place the decimal in the quotient exactly over the decimal in the dividend.

(1) Placing decimals

$$(a) \quad \begin{array}{r} 9.72 \\ 9 \overline{)87.48} \end{array}$$

$$(b) \quad \begin{array}{r} .04 \\ 25 \overline{)1.00} \end{array}$$

(2) Using decimals in quotients

$$(a) \quad \begin{array}{r} 1 \frac{3}{4} \\ 4 \overline{)7} \end{array}$$

$$(b) \quad \begin{array}{r} 1.75 \\ 4 \overline{)7.00} \end{array}$$

(3) Dividing a whole number by a decimal

$$(a) \quad .3 \overline{)6.} \quad \text{change to} \quad 3 \overline{)60.}^{\text{20.}}$$

$$(b) \quad .5 \overline{)35.} \quad \text{change to} \quad 5 \overline{)350.}^{\text{70.}}$$

(4) Dividing a decimal by a decimal

$$x09. \overline{)8 \times 10.}^{\text{90.}} \quad (\text{multiply both by 100})$$

$$1x2. \overline{)4 \times 6.8}^{\text{3.9}} \quad (\text{multiply both by 100})$$

The teacher should work for understanding of this concept rather than memorization of a rule.

(5) Dividing 10, 100, and 1,000.

a short cut always.

$$(a) \quad 100 \div 10 = 10$$

$$(b) \quad 100 \div 100 = 1$$

$$(c) \quad 100 \div 1,000 = .1$$

(6) Write a generalization for (a), (b), and (c) above.

Place the decimal in these divisions:

$$12.45 \div 10 = \underline{\hspace{2cm}}$$

$$175 \div 100 = \underline{\hspace{2cm}}$$

$$7000 \div 1000 = \underline{\hspace{2cm}}$$

History of Mathematics

Subject Matter To Be Covered

1. General information
2. Earliest mathematicians
3. Giants of the renaissance and later periods
4. History of items relating to mathematics

Activities

1. General information

Students should spend some time learning the history of mathematics. Biographies and descriptions of famous mathematicians could be the basis for sharing periods, reports, or play acting. There are several mathematics plays in existence which illustrate mathematics information. One such play concerns a girl who has 12 fingers and develops her own number system based on 12 instead of the normal 10.

2. Earliest mathematicians

Identify the following:

- a. Thales
- b. Pythagoras
- c. Euclid
- d. Archimedes
- e. Eratosthenes
- f. Aristarchus of Samos
- g. Ptolemy of Alexandria

3. Giants of the Renaissance and later periods

Identify the following:

- a. Copernicus
- b. Newton
- c. Descartes
- d. Kepler
- e. Pascal
- f. Galilei

4. History of items relating to mathematics

Give the history of the following:

- a. Calendar
- b. Clocks
- c. Stars and navigation
- d. Measures
- e. Counting
- f. Early scientists and astronomers

Mental Mathematics

Subject Matter To Be Covered

1. Equivalent, decimals, and fractions
2. Mental mathematics involving the four fundamental operations
3. Riddles, games, and puzzles

Activities

1. Equivalent, decimals, and fractions - The child should be able to immediately recall the decimal values of common fractions.

Example: $1/2, 1/3, 2/3, 1/4, 3/4, 1/5, 2/5, 3/5, 4/5, 1/6, 5/6,$
 $1/8, 3/8, 5/8, 7/8, 1/10, 3/10, 7/10, 9/10$

2. Mental mathematics involving the four fundamental operations - Various shortcut mental processes in mathematics can be taught.

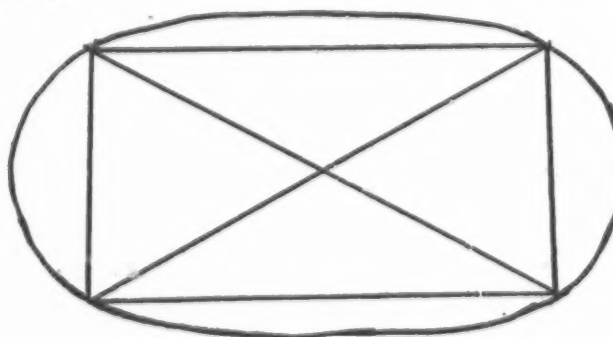
Examples:

- a. $42 \cdot 38 = (40 + 2)(40 - 2) = (40)(40) - (2)(2) = 1600 - 4 = 1596.$
- b. To square any two-digit number ending in 5, the last two digits of the product will be 25 and the first two digits will be the product of the first digit in the number to be squared and the next consecutive digit. Thus, $(65)^2 = 4225$; $(6)(7) = 42$;
 $(65)^2 = 4225.$

3. Riddles, games, and puzzles

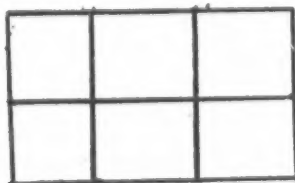
Examples:

- a. Three men were attending a convention in another city. They registered at a hotel and were charged \$10.00 each. The desk clerk decided he had overcharged them by \$5.00, and he sent the bellhop to pay them back their money. In order to conveniently divide the \$5.00, the bellhop kept \$2.00 for himself and gave each man \$1.00. That meant that each man paid \$9.00 for his room. There were 3 men paying \$27.00 and the bellhop had \$2.00, which only adds to \$29.00. What happened to the other dollar?
- b. Trace this design without picking up your pencil. Do not retrace a line.



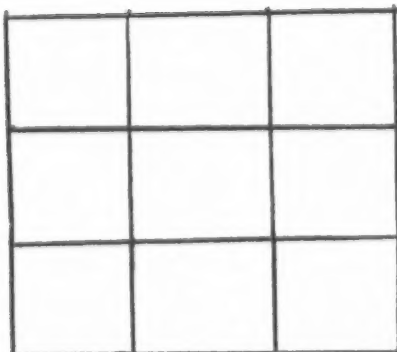
- c. A 200-pound man and his two sons each weighing 100 pounds want to cross a river. If they have only one boat and it can safely carry only 200 pounds, how can they cross the river?
- d. Eight marbles all have the same size, color, and shape. Seven of them have the same weight and the other is heavier. Using a balance scale, how would you find the heavy marble if you make only two weighings?
- e. Select four one-digit numbers. A timed contest could determine the greatest number of integers to be formed from these numbers. Various restrictions could be placed on the numbers, such as only forming four-digit integers, or forming decimals and fractions.
- f. Organize two teams and have each select a captain. Prepare two sets of consecutively numbered cards, each set with a different color. Each team will have one set of cards, and each player will have one card. The leader calls a number, such as 63. Each captain selects players to run to the front of the room, face about, and hold up the number so all can see. The first team having completed the sum indicated wins as many points as he has players. Hence, the captain who can quickly send up the largest number of player wins the most points.
- g. Math puzzles like the following (which involve deleting lines) will provide stimulation to able students. Extra lines are not permissible for final answers.

(1)

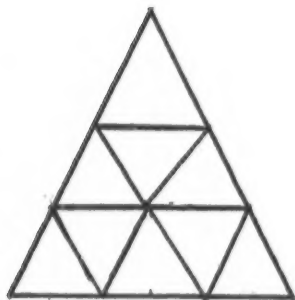


Take away 2 matches and leave 5 squares.

(2)

Take away 8 matches and leave
3 squares

(3)



Take away 5 matches and leave 5 triangles.

Bibliography -- Mathematics

A. Books

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- Archibald, Raymond Clare, Outline of the History of Mathematics. Oberlin, Ohio: The Mathematical Association of America, Inc., 1941.
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- Gilles, William F., The Magic and Oddities of Numbers. New York: Vantage Press, Inc., 1953.
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- Hogben, Lancelot, The Wonderful World of Mathematics. Garden City, New York: Garden City Publishing Company, Inc., 1955.
- Jones, Samuel I., Mathematical Clubs and Recreations. Nashville, Tenn.: S. I. Jones Co., 1940.
- Karpinski, Louis Charles, The History of Arithmetic. New York, Rand, McNally and Co., 1925
- Meserve, Bruce E. and Max A. Sobel, Mathematics for Secondary School Teachers. Englewood Cliffs, N. Y., 1962

National Council of Teachers of Mathematics, Emerging Practices in Mathematics Education. Washington 6, D. C.: N.C.T.M., 1954.

Parke, Nathan Grier, Guide to the Literature of Mathematics and Physics. New York: McGraw-Hill Book Co., Inc., 1947.

Roskopf, Muron Frederick, Modern Mathematics for Junior High School. Morristown, N. Y.: Silver Burdett Co., 1961.

School Mathematics Study Group, Series of Texts, Connecticut: Yale University Press, 1961.

Smith, David Eugene and Jekuthiel Ginsburg, Numbers and Numerals. New York: Bureau of Publications Teachers College, Columbia University, 1937.

Space Primer - An Introduction to Astronautics. Dept. 120, Convair-Astronautics, P.O. Box 1128, San Diego 12, California, 1959.

Spitzer, Herbert F., Practical Classroom Procedures for Enriching Arithmetic. Atlanta: Webster Publishing Co., 1956.

Student's Glossary of Arithmetical - Mathematical Terms. Summit, N. Y.: Laidlaw Brothers.

Swain, Robert L., Understanding Arithmetic. New York: Rinehart and Co., 1957.

Vergara, William C., Mathematics in Everyday Things. New York: Harper & Brothers, 1959.

Woodring, Maxie Nave and Vera Sanford, Enriched Teaching of Mathematics in the Junior and Senior High School. New York: Teachers' College, Columbia University, 1938.

B. Unpublished Materials

"An Enrichment Curriculum in Arithmetic," Clayton Public Schools, Grade 6, School District of Clayton, 1959.

"Challenging the Able Learner," Cincinnati Public Schools, Intermediate Grades, Cincinnati, Ohio, 1957.

"General Guide for Teachers With Provisions for Superior Pupils," El Paso Public Schools, Grades 5 & 6, El Paso, Texas, 1957.

THE SCIENCE PROGRAM
FOR GRADE SIX

Areas to Be Discussed

- I. The Weather
- II. The Changing Earth
- III. Embryology
- IV. Atomic Energy
- V. The Universe
- VI. Aero-Space Travel

Philosophy of Science

We believe a child learns by purposeful doing and by means of creative expression. Activities involved in the learning process include problem solving, teacher-pupil planning, discussions, conducting and observing experiments, collecting specimens, consulting resource persons, participating in field trips, evaluating information, and using library materials, supplementary texts, and audio-visual aids.

We believe that all phases of purposeful doing are more evident and more pronounced among the gifted than among the average or slow. Learning for the gifted can proceed at a more rapid pace and it is possible to have acceleration for the gifted where it would be a failure with the average or with the slow.

Students who show remarkable accomplishment should be encouraged by being challenged by their fellow students and teachers with superior training and ability. Gifted children should have a program that is built for them and which will provide for their fullest development. Only by giving special attention and treatment to educational matters can our nation benefit from the superior abilities of this group. Our greatest waste in education has been with the gifted pupils.

Gifted children may be expected to understand and interpret phenomena, appreciate their physical environments, use scientific attitudes, apply scientific methods to problem solving and acquire accurate and useful scientific concepts. They may be expected to study the lives of great scientists and to learn what contributions these scientists have made to our civilization. An appreciation of the great men and women of science should be a logical outcome of this study.

These students should learn that there are many community and area resources that can be used in their study of science, and that resource people can be persuaded to assist them in their learning activities and individual or class projects.

Weather

Subject Matter to Be Covered

1. Background material on early concepts and superstitions concerning weather
2. Basic theories concerning causes of weather
3. Instruments used to study and predict weather changes
4. Cloud formations
5. Long-range weather forecasts
6. Methods of controlling weather
7. Recent advances in obtaining weather information
8. Special adaptation features of animals due to weather
9. Effects of weather on migratory habits of animals

Activities

1. Have students report on early concepts concerning weather.
2. Make lists of superstitions students know or have heard concerning weather. Have students decide how these were probably started. Have students test the accuracy of these by observation.
3. Keep daily charts on weather. Record temperature, barometric pressure, humidity and rainfall.
4. Ask students to demonstrate and explain:
 - a. Homemade thermometer
 - b. Homemade aneroid barometer
 - c. Homemade psychrometer
 - d. Convection currents
5. Examine daily weather maps from newspaper and note clockwise direction of wind from high pressure area and counter-clockwise direction of wind from low pressure area.
6. Collect newspaper and periodical articles concerning recent methods of obtaining weather information, methods of controlling extreme weather, and long-range forecasts.
7. After discussion of articles for understanding, display materials for all to share.
8. Request students to read and report on various migratory habits of animals and adaptations of animals due to weather.
9. Visit a weather bureau.
10. Students may plan and develop bulletin board with animals, showing protective coloration, routes of bird migration, etc.
11. Direct students in making a weather station.
12. Write to U. S. Weather Bureau for samples of weather maps and other information.

Materials Necessary for This Study

1. Weather maps
2. Maps and globes
3. National Geographic magazine and other periodicals
4. Encyclopedias and other reference materials on weather
5. Bottles, balloons, thermometers, alcohol, fruit jars, straws, hot plates

Bibliography

Burnett, R. W., Teaching Science in the Elementary School. New York: Holt, Rinehart and Winston, 1960.

Gallant, Roy A., Exploring the Weather. New York: Doubleday and Co.

Spilhaus, Weathercraft. New York: Viking Press.

Tannehill, All About Weather. New York: Random House.

The Changing Earth

Subject Matter to Be Covered

1. Formation of three main classifications of rocks
2. Relationship between types of rocks found in an area and its geological history
3. Geological changes which have taken place such as
 - a. Mountain formations
 - b. Glacial valley formations
 - c. Lake formations
 - d. Dustbowls
 - e. Caverns
4. Importance of rocks as
 - a. Soil builders
 - b. Minerals
5. Importance of fossils in determining age of earth
6. Causes of earthquakes, volcanoes, and tidal waves
7. Instruments and methods used to detect imperfections and deposits below the surface of the earth
8. Effects of erosion

Activities

1. Plan a field trip in which students may gather a variety of rocks.
2. Find a good rock identification book and let students label their collections and give significant information regarding them.
3. Read books on formation of rocks and relate information to own area.
4. Locate places in the immediate area where geological principles are exemplified and visit these.
5. Have students visit town library and write the State Geological Survey to see if information is available regarding the geological history of their region.
6. Have committees choose a particular geological change and report their research work to class.
7. Display rocks with mosses and lichens on them and discuss importance of such plants.
8. Read about fossils and discuss how they are important in determining the age of the earth.
9. Let students prepare some artificial fossils and explain how they are formed naturally.
10. Visit a mineral laboratory in own area.
11. Invite a "rock hound" to show and explain his collection.
12. Prepare some crystals by evaporation and other methods to show how crystals are formed and how minerals are often identified by their shape.
13. View films and filmstrips of volcanoes.
14. Collect newspaper and magazine articles concerning earthquakes, volcanic eruptions and tidal waves and prepare a bulletin board display.

15. Make charts of the volcanoes of the world. Tell which are active and which are inactive.
16. Use recent periodicals and books regarding seismographic soundings for oil fields. Discuss these.
17. Observe effects of erosion in an area.
18. Have student demonstrations on causes of erosion.
19. Prepare a list containing various ways students may help in preventing erosion in their own area.
20. Have brief student talks about trips to interesting places which have new meaning in light of this study.

Materials Necessary for This Study

1. Several good books on rock identification
2. Samples of gemstones
3. Plenty of rocks
4. Information from State Geological Survey

Bibliography

Holder, Alan, and Phyllis Singer, Crystals and Crystal Growing. New York: Doubleday and Co., Inc., 1962.

Zinn, Herbert S. and Paul R. Shaffer, Rocks and Minerals. New York: Golden Press, 1957.

Embryology

(Incubation of Chicken Eggs to Study Comparative
Embryo Development of Chick and Human)

Subject Matter to Be Covered

1. Cells as a property of all living things
2. The cell as a reproductive device
3. Growth of an embryo by cell division
4. Oviparous and viviparous animals
5. Similarities in embryonic development of vertebrate and lower animals
6. Comparison of growth requirements for chick embryo and human embryo
7. Comparison of development stages of chick embryo and human embryo
8. Cell differentiation
9. Comparison of gestation periods for several vertebrates

Activities

1. Have students make bulletin board showing oviparous and viviparous animals.
2. Keep individual notebooks using some dittoed illustrations of embryo. The students will fill in names of parts.
3. Plan group project for students, using outside references, to secure information on embryonic development of various animals.
4. Have students keep records of progress of embryonic development of chicken as egg is opened. Compare this with human embryo.
5. Make drawings of progress for bulletin board.
6. Teacher may discuss progress of development of chick embryo and compare this to human development.
7. Make vocabulary list of new terms learned.

Materials Needed for This Study

1. Commercial incubator (about \$20)
2. Three or four dozen fertile eggs
3. Saucer, tablespoon, tweezers, single-edge razor blade, and manicure scissors
4. One or two quarts formaldehyde to preserve embryos
5. Wide-mouth jars and lids for specimen
6. Good college textbook on embryology

Bibliography

Ets, Marie Hall, The Story of a Baby. New York: Viking Press, 1939.

Hamilton, Boyd, and Mossman, Human Embryology. Baltimore, Maryland: The Williams and Wilkins Co., 1945.

Patten, Bradley, M., The Early Embryology of the Chick. Philadelphia: The Blakiston Co., 1943.

Regents of the University of California, Embryology, A Teacher's Manual. Berkeley, California: University of California Printing Department, 1961. Mailing Address: Elementary School Science Project, 2232 Piedmont Avenue, Berkeley 4, California.

Selsam, Millicent E., All About Eggs. New York: International Publishing Co., 1952.

_____, Egg to Chick. New York: International Publishing Co., 1946.

Film: "Development of Chicken Embryo," Coronet Films.

Atomic Energy

Subject Matter to Be Covered

1. Concept of the atom
2. Isotopes of atoms
3. Natural radioactivity
4. Man-made radioactivity
5. Peacetime uses of atomic energy

Activities

1. Read textbooks and other references about such topics as atoms, atomic energy, and atomic symbols.
2. Prepare a chart or bulletin board of drawings of kinds of atoms and their structure. Use simple atoms (elements).
3. View films and filmstrips with emphasis on the atom and its structure.
4. Be sure to get Walt Disney's "Our Friend the Atom."
5. Make styrofoam models of simple atoms.
6. Have oral and written reports of great scientists who helped discover radioactivity.
7. Teacher may give simple explanation as to why many elements have several atoms with different weights, but same atomic number.
8. Prepare simplified periodic chart of elements showing atomic number and atomic weight.
9. Read about and discuss how man-made elements are produced, and how many have been produced to date. What is their importance?
10. Have group research on peacetime uses of atomic energy, and let groups report to class.
11. If possible, have a qualified person demonstrate a geiger counter.
12. Have students make a list of unfamiliar words found in this study.

Materials Needed for This Study

1. Styrofoam balls and straws
2. Tagboard
3. Films and filmstrips

Bibliography

All About the Atom. New York: Random House.

Barrow, Your World in Motion, A Story of Energy. New York: Harcourt, Brace.

Bischof, Atoms at Work. A Preview of Science. New York: Harcourt, Brace.

Hecht, Selig, Explaining the Atom. New York: The Viking Press, 1947.

Lewellen, John, You and Atomic Energy. Chicago: Childrens Press, 1949.

Manufacturing Chemists' Assoc., Inc., Matter, Energy and Change.

Meyer, Jerome S., Picture Book of Molecules. New York: Lothrop, Lee and Shepard Company, 1947.

The Walt Disney Story of the Atom. New York: Haber, Simon and Schuster.

Film: "Strange Case of the Cosmic Rays." Bell Telephone Laboratories. (May be obtained from any Southern Bell Telephone Business Office)

The Universe

Subject Matter to Be Covered

1. Identification of the prominent constellations
2. Concept of size, shape, distance of planets from sun and earth
3. Composition of sun and planets
4. Instruments and devices used to study the heavenly bodies
5. Effects of moon on the surface of the earth

Activities

1. Discuss Greek mythology as concerned with stars and planets.
2. Read and make oral reports on the individual planets.
3. Prepare a chart of the solar system giving as much technical information as possible.
4. Gather recent articles regarding latest discoveries about planets. Discuss articles.
5. Draw pictures of the planets as we think they are after studying them.
6. Make scale models for display of the solar system.
7. Observe and discuss film on solar system.
8. Gather information and pictures of instruments used to study planets and stars. Make a bulletin board display of these.
9. Consider the history of the telescope.
10. Read and report on location and technical knowledge of important observatories of the world.
11. Construct a star map.
12. Have students write a short story about their first trip to the moon or a planet.
13. Observe film on Moon.
14. Read and discuss effects of the moon on the tides of the earth.
15. Make a list of unfamiliar words found in this study.

Materials Needed for This Study

1. Recent periodicals dealing with the solar system
2. Construction paper
3. Compass
4. Bulletin board materials
5. World globe

Bibliography

Pickering, James S., 1001 Questions Answered About Astronomy. New York: Dodd, Mead and Company, 1962.

Wilder, Golden Book of Astronomy. New York: Golden Press.

Experimenting In Your Science. Boston, Massachusetts: Ginn and Company.

Aero-Space Travel

Subject Matter to Be Covered

1. Problems involved in space travel
2. Principle of the gyroscope and how it is used in guiding space crafts
3. Types of fuels used in rockets
4. Types of satellites and their importance in studying outer space
5. Concept of International Geophysical Year

Activities

1. List problems, as students see them, which are involved in space travel. Arrange for small groups to take each problem, gather all the information they can and present their findings to the whole class for discussion.
2. Let students demonstrate the gyroscope and explain the principle involved. Teacher should relate this to its importance in guiding space craft.
3. Bring up-to-date articles dealing with rockets and man-made satellites to class and discuss them.
4. Prepare a display of materials brought by students in a "Current Events" corner.
5. Make papier-mache or cardboard models of rockets and satellites.
6. Observe demonstration and film on Telstar.
7. Construct a vocabulary list of related words.
8. Teacher may discuss main points of International Geophysical Year.

Materials Necessary for This Study

1. Recent reference materials on space travel
2. Cardboard, etc., for models
3. Bulletin board materials
4. Toy gyroscope

Bibliography

Fraser, Ronald, Once Round the Sun. New York: The MacMillan Company, 1958.

Life magazine, Space and Space Travel. May 13, 1961.

Newlon, Clarke, 1001 Questions Answered About Space. New York: Dodd, Mead and Company, 1962.

Telstar Demonstration and Film. (May be obtained from any Southern Bell Telephone Business Office)

THE ART PROGRAM
FOR GRADE SIX

Areas to Be Discussed

- I. Prehistoric Art
- II. Egyptian Art
- III. Greek Art
- IV. Roman Art
- V. Medieval Art
- VI. Renaissance Art
- VII. Modern Art

Philosophy of Art

The history of art is a painless way to correlate everything we have learned. It is our personal heritage and a means of viewing man's progress through the ages. As we know, art is a form of communication older than writing. Thus through architecture, sculpture, and painting we may better understand the culture of the divisions of history. We begin with Prehistoric Art and continue through Ancient, Medieval, Renaissance, and Modern Art.

Through the study of art children may develop a greater understanding and appreciation of historical and contemporary arts. Art may be effectively correlated with social studies or other areas in the curriculum. Children may reflect their own creative ability by participating in the many suggested activities. This study may help children become aware of, and perhaps interested in, the professional opportunities provided through art.

Prehistoric Art

Subject Matter to Be Covered

1. Old Stone Age (20,000 - 8,000 B.C.)
2. Middle Stone Age (8,000 - 2,000 B.C.)
3. New Stone Age (2,000 - 1,600 B.C.)
 - a. Architecture
 1. Forms of dwelling
 2. Reasons for forms
 3. Religious influence on architecture
 - b. Sculpture
 1. Forms of sculpture
 2. Reasons for forms
 - c. Paintings - cave wall pictures
 1. Tools used
 2. Significance of pictures
 3. Coloring of pictures

Activities

1. Have students bring in books about prehistoric art.
2. Have committees report on information gathered from these books.
3. Make bulletin boards about prehistoric art.
4. See movies on prehistoric art.
5. Students might construct some miniature prehistoric structures.
6. Have students make copies of prehistoric paintings.
7. Let students make sketches of each type of architecture.

Materials Necessary for This Study

1. Books and pictures on prehistoric art
2. Encyclopedia
3. Paints
4. Construction paper
5. Bulletin board materials
6. Movie on prehistoric art
7. Movie projector

Bibliography

- Craven, Thomas, The Rainbow Book of Art. World Publishers, 1956.
- Hillyer, V. M., A Child's History of Art. New York: Appleton-Century, Crofts, 1951
- Janson, H. W., The Story of Painting for Young People. Abrams, 1959.
- Poulik, Josef, Prehistoric Art. London: Spring Books, 1957.

Egyptian Art

Subject Matter to Be Covered

1. Historical Background and Geographical Influences
 - a. Life centered around the Nile Valley
 - b. Stone resources
 - c. Soil
 - d. Housing
 - e. People
2. Architecture
 - a. Development of the pyramid
 - b. Rock-cut tombs of Middle Kingdom
 - c. Temples
3. Sculpture
 - a. Types
 - b. Characteristics
4. Painting
 - a. Types
 - b. Characteristics

Activities

1. Have students collect pictures of Egyptian art.
2. Let students bring stories about Egyptians.
3. Have students read their stories to class.
4. Make bulletin boards.
5. Show filmstrips.
6. Let students do picture writing.
7. A committee might do a research project on Egyptian paints.
8. Study the sphinx and the pyramids as feats of art.

Materials Necessary for This Study

1. Film projector and filmstrips
2. Egyptian pictures
3. Books about Egypt
4. Bulletin board materials

Bibliography

- Craven, Thomas, The Rainbow Book of Art. World Publishers, 1956.
- Hillyer, V. M., A Child's History of Art. New York: Appleton-Century, Crofts, 1951.
- Janson, H. W., The Story of Painting for Young People. Abrams, 1959.
- Van Loon, Hendrik, The Arts. New York: Simon and Schuster, Inc., 1937.

Greek Art

Subject Matter to Be Covered

1. Influence of Minoan Art
 - a. Archaic Age
 - b. Transitional Period
 - c. Golden Age
2. Greek architecture
3. Greek sculpture
 - a. Characteristics
 - b. Ages
 - (1) Archaic Age (625 - 480 B.C.)
 - (2) Transitional Period (480 - 450 B.C.)
 - (3) Golden Age (450 - 400 B.C.)
4. Greek paintings
5. Greek gods and goddesses
6. Contributions of the Greeks to the world

Activities

1. Have committees discuss the different ages of Greek Art.
2. Show movies and slides on the three ages.
3. Discuss the various gods and goddesses and show their relationship to Greek Art.
4. Collect and illustrate several myths. This might be done by a diorama.
5. Study the three main types of columns.
6. Collect pictures of buildings in Athens.
7. Invite someone who has visited Athens to show slides of that city.

Materials Necessary for This Study

1. Movies
2. Slides
3. Projectors
4. Bulletin board materials

Bibliography

Hamilton, Edith, Mythology. Boston: Little, Brown and Company, 1942.

Myers, Bernard, Art and Civilization. New York: McGraw-Hill Book Company, 1957.

Roman Art

Subject Matter to Be Covered

1. Roman architecture
 - a. Secular buildings
 - b. Religious buildings
2. Roman sculpture
3. Roman paintings or pictorial arts
4. Roman gods and goddesses

Activities

1. Have students write a paragraph on a Roman god or goddess.
2. Have students bring in Roman paintings.
3. Introduce charcoal drawing.
4. Let students draw a picture of the god or goddess they wrote about.
5. Have students make a mural of Roman art.
6. Discuss the gladiators and their relation to the Coliseum.
7. Visit buildings which are representative of Roman architecture.

Materials Necessary for This Study

1. Charcoal and paper
2. Books on Roman art
3. Pictures

Bibliography

Gloag, John, Guide to Western Architecture. New York: Grove Press, Inc., 1958.

Stites, Ramond S., The Arts and Man. McGraw-Hill Book Company, Inc., 1940.

University Prints, Greek and Roman Architecture. Boston, Mass.: University Press, 1927.

Medieval Art

Subject Matter to Be Covered

1. The position of Medieval art in history
2. Characteristics of Medieval art
3. Influence of Medieval art
4. The downfall of Medieval art

Activities

1. Have students bring in pictures of Medieval art.
2. Show students on map where Medieval art had its beginnings and the extent of its influence.
3. The teacher may tell about the end of Medieval art and the beginning of Renaissance.
4. Show slides of some of the great cathedrals.
5. Let the students make stained glass windows.
6. Discuss the feudal system and the brilliant colors often associated with it.
7. Collect pictures of early castles and look for characteristics of Medieval art.
8. Discuss Gothic architecture.
9. Visit a cathedral, if possible, and pick out characteristics of the various types of architecture that class has studied.

Materials Necessary for This Study

1. Books on Medieval art, especially Morey's Medieval Art
2. Slides of great cathedrals

Bibliography

Morey, Charles Rufus, Medieval Art. New York: W. W. Norton & Company, Inc., 1942.

Janson, Horst W., The Story of Painting for Young People. New York: Harry N. Abrams, Inc., 1952.

Renaissance Art

Subject Matter to Be Covered

1. St. Peter's Basilica
2. Raphael
3. Michelangelo: Sistine Chapel
4. Giotto
5. Invention of oil painting: Van Eyck Brothers
6. Frescoes
7. Titian
8. Leonardo da Vinci: Mona Lisa
9. The Flemish painters

Activities

1. Show slides of St. Peter's Cathedral.
2. Display pictures of Pope Paul's coronation to show view of the church.
3. Have reports on the main artists of the period.
4. Show slides of the above artists' most famous works and point out their main characteristics.
5. Collect newspaper clippings of the 1963 trip of the Mona Lisa to the United States.
6. Experiment with oil paints.
7. Introduce perspective and colored chalk.

Materials Necessary for This Study

1. Slides of St. Peter's Church in Rome
2. Slides of famous painters' works
3. Pictures of Pope Paul's coronation (Life magazine)
4. Newspaper clippings
5. Oil paints and brushes
6. Colored chalk
7. Paper for charcoal drawings

Bibliography

Berenson, Italian Painters of the Renaissance. London: Phaidon Press, 1956. (Distributed by Doubleday Company, Garden City, New York)

Chandler, Anna Curtis, Story-Lives of Master Artists. Philadelphia: J. B. Lippincott Company, 1953.

Goldscheider, Ludwig, Michelangelo. London: Phaidon Press, 1959. (Distributed by Doubleday Company, Garden City, New York)

Young, Joseph L., Course in Making Mosaics. New York: Reinhold Publishing Co., 1957.

Modern Art

Subject Matter to Be Covered

1. The place of modern art in today's world
2. The beginnings of modern art
3. Theories of modern art
 - a. Expressionism
 - b. Postimpressionism
 - c. Impressionism
 - d. Neo-impressionism
 - e. Twentieth Century
 - (1) Dadaism
 - (2) Cubism
 - (3) Surrealism
 - (4) Automatism
4. Media used in modern art
5. Types of modern art

Activities

1. Let children work with as many of the following crafts as possible:
 - a. Crayon resist
 - b. Metal tooling
 - c. Ceramics
 - d. Papier maché
 - e. Crayon encaustic
 - f. Vegetable printing
 - g. Leather craft
 - h. Mobiles
 - i. Transparencies
 - j. Carving
 - k. Spattering and spraying
 - l. Nut crafts
 - m. Masks
 - n. Puppets
 - o. Corn crafts
2. Show slides of pictures by several of the best known modern artists.
3. Aid children in appreciation of modern art by helping them understand what modern artists are trying to accomplish.
4. Play several pieces of modern jazz to show how music, too, has undergone changes as well as art.

Materials Necessary for This Study

1. Books and slides of modern art
2. Art supplies such as crayons, leather, metal, art paper, reed, clay, wood, etc.
3. Records of examples of modern jazz

Bibliography

Barr, Alfred H., Jr., Picasso: Fifty Years of His Art.
New York: Simon and Schuster, 1946.

Baur, John I., Nature in Abstraction. New York: Macmillan
Company, 1958.

Cheney, Sheldon, The Story of Modern Art. New York: The Viking
Press, 1941.

Paine, Irma Littler, Art Aids for Elementary Teachers. Tacoma,
1953.

Winston, Leon Loyal, Art in Elementary Education. New York:
McGraw-Hill Book Company, Inc., 1942.

Yoseloff, Thomas, The Challenge of Modern Art. New York:
Thomas Yoseloff, Inc., 1957.

THE MUSIC PROGRAM

FOR GRADE SIX

Areas to Be Discussed

- I. Cultural
- II. Fundamentals of Music Theory
- III. Creation
- IV. General Activities for the Study of Music

Philosophy of Music

We believe music studies should encourage children to produce music, either through instruments or through their voices.

This music may be a performing skill that brings satisfaction to themselves and others in leisure time and in community activities.

We feel that if pupils develop the proper understanding of music, it can become a real satisfaction to them as they listen.

We believe that music can bring relaxation and pleasure to everyone. Appreciation of good music can become a part of each person's life.

If music is used to enrich all subjects in the curriculum, we can expect a greater appreciation and participation on the part of gifted children, as well as all children. Surprising creative activities will take place, a cultural background on the life of our people and of other people will be acquired, and a general, as well as specific, knowledge concerning the theory of music will result.

Cultural

Suggested Activities

1. Trace historical background of folk songs, both at home and abroad.
2. Do research and reporting on development of music from primitive to present-day vocal and instrumental.
3. Trace contribution of other countries to American music, art, and literature.
4. Study music from the viewpoint of its functions in the life of our people.

Fundamentals of Music Theory

Suggested Activities

1. Become familiar with structure of musical composition.
2. Make a study of notation.
3. Study key signatures.
4. Make a study of tempo.
5. Become familiar with metronomic markings.
6. Acquaint students with the composition of a symphony orchestra and the contribution of each individual instrument.
7. Develop the habit of listening discriminately.
8. Offer opportunity to foster creativity in composing a single melody.
9. Increase enjoyment derived from singing and from rhythmic activities.

Creation

Suggested Activities

1. Students may play instrumental accompaniments for class singing, including piano, drum, castanets, zither, guitar, bells, xylophone, and other instruments.
2. Sing descants while class sings melodies of songs.
3. Compose music to class poem, originating rhythms.
4. Create a dance to interpret a study topic or dramatization.
5. Make tape recordings of class musical activities.
6. Make original instruments.
7. Make use of assembly and homeroom musical activities.
8. Combine music and art activities to enrich Social Study Units and the Language Arts.
9. Present original creations by individual students.

General Activities for the Study of Music

1. Develop musical ability and appreciation.
2. Provide experiences in ear training and rhythmic training.
3. Encourage, stimulate, and develop an enriched program in music.
4. Create a fine interpretation of music.
5. Assist pupils in mastery of song materials.
6. Provide group singing.
7. Teach music reading skills.
8. Make a dictionary of musical terms and symbols.
9. Listen to recording of different interpretation of the same music. Critically compare them.
10. Listen to the music of great composers to determine what it expresses. Study the life of the composer.
11. Learn the story of jazz and opera.
12. Critically compare musical selections heard on radio and T.V. programs.

Materials Necessary for the Study of Music

1. The State adopted texts and record albums for all grades.
2. Reference materials
3. Radio
4. T.V.
5. Orchestral instruments
6. Rhythmic records
7. Biographies of composers and musical artists
8. History and construction of instruments
9. Services of music supervisor in planning work
10. Books on music easily understood by students
11. Pitch pipes
12. Autoharp
13. Record player

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